

REMARKS

Applicants respectfully request reconsideration of the present application in view of the foregoing amendments and in view of the reasons that follow. Claims 1-17 have been rejected. Claims 2, 4, and 11 and the Specification have been amended, and a new Figure 1 is provided herewith. No new matter has been added. Accordingly, Claims 1-17 will be pending in the present application upon entry of this reply and amendment.

Claims 2, 4, and 11 have been amended to more clearly recite the subject matter claimed therein. Please note that the formula in Claim 2 has been amended such that "Q_v" is replaced with "q_v".

A detailed listing of all claims that are, or were, in the application, irrespective of whether the claim(s) remain under examination in the application, is presented, with an appropriate defined status identifier.

Information Disclosure Statement

On pages 7-8 of the Office Action, the Examiner indicated that:

The Information Disclosure Statement (PTO-1449) filed 9/17/2004 references DE-19540827. Since this reference seems to read on applicant's claims for the instant application, a full translation should be provided.

A translation of DE 19540827 is provided herewith in a supplemental Information Disclosure Statement.

Drawings

On page 2 of the Office Action, the Examiner objected to the drawings. The Examiner stated:

1. The subject matter of this application admits of illustration by a drawing to facilitate understanding of the invention [see claims 15 and 17]. Applicant is required to furnish a drawing under 37 CFR 1.81. No new matter may be introduced in the required drawing.
2. The drawings are objected to under 37 CFR 1.83(a). The drawings must show every feature of the invention specified in the claims. Therefore, the battery, the temperature bands, the

Amendments to the Drawings:

In response to the Examiner's objection to the drawings under 37 C.F.R. § 1.83(a), the Applicants respectfully request that the attached drawing (Figure 1) be inserted in the application. Support for this drawing is described in the "Remarks" section of this Reply and Amendment.

In accordance with the Examiner's statement on page 2 of the Office Action, such drawing sheet is labeled "Replacement Sheet" in the page header (as per 37 C.F.R. § 1.84(c)).

A separate Transmittal of Formal Drawings is submitted.

size, the measure, the motor vehicle, the temperature measurement device, the computation device must be shown or the feature(s) canceled from the claim(s). No new matter should be entered. Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application.

A drawing has been provided herewith to address the Examiner's objections, and the Specification has been amended to include a description of such drawing. Support for the drawing and the description may be found, for example, at paragraphs [0013]-[0014] and Claims 16 and 17 of the Specification. Accordingly, no new matter has been added.

With respect to the Examiner's contention that the "temperature bands" and "the measure" must be shown in the drawings, the Applicants submit that such features are not physical features, and thus do not permit of illustration. The Applicants submit that the submission of new Figure 1 and its accompanying description in the Specification overcome the Examiner's objection. Reconsideration and withdrawal of the objections to the drawings is thus respectfully requested.

Specification

On pages 2-3, the Examiner objected to the Specification. The Examiner stated:

1. The specification has not been checked to the extent necessary to determine the presence of all possible minor errors. Applicant's cooperation is requested in correcting any errors of which applicant may become aware in the specification. For example, "the further state variables" is idiomatic, and needs to be redefined.
2. The specification is objected to as failing to provide proper antecedent basis for the claimed subject matter: "applicable time", "linked wear variable". See 37 CFR 1.75(d)(1) and MPEP § 508.01(o). Correction is required.

With respect to the "further state variables" asserted by the Examiner to be "idiomatic" the Applicants note that paragraph [0027] of the present Specification includes the following description (underlining added for emphasis):

It is particularly advantageous to link the calculated wear variable to further state variables which describe the state of the energy store, and to determine a linked wear variable Q_v from

this. The further state variables may be determined using one or more different methods for determining the wear to an electrochemical energy store. Methods are preferably used which take account of other effects that contribute to the wear of electrochemical energy stores than the temperature dependency of the time-dependent wear. A measure for the present storage capacity can be calculated by subtraction of the linked wear variable from the initial capacity of the electrochemical energy store.

The Applicants submit that such explanation provides a clear and concise description of what is meant by the term “further state variables,” and that such term would be understood by those of ordinary skill in the art reviewing the present application. Accordingly, the Applicants submit that no correction is required.

With respect to the Examiner’s contention that no antecedent basis is provided in the Specification for the term “linked wear variable”, the Applicants note that paragraph [0027] of the present Specification includes the following description (underlining added for emphasis):

It is particularly advantageous to link the calculated wear variable to further state variables which describe the state of the energy store, and to determine a linked wear variable Q_v from this. The further state variables may be determined using one or more different methods for determining the wear to an electrochemical energy store. Methods are preferably used which take account of other effects that contribute to the wear of electrochemical energy stores than the temperature dependency of the time-dependent wear. A measure for the present storage capacity can be calculated by subtraction of the linked wear variable from the initial capacity of the electrochemical energy store.

With respect to the Examiner’s contention that no antecedent basis is provided in the Specification for the term “applicable time”, the Applicants assume that the Examiner is referring to Claim 11, which has been amended to recite: “The method of Claim 1 wherein the battery has a storage capacity and further comprising determining the storage capacity using the wear variable by relating the wear variable to a storage capacity of the battery at an earlier time than the time at which the wear variable was determined.”

The Applicants note that paragraph [0024] of the present Specification includes the following description (underlining added for emphasis):

The storage capacity of the electrochemical energy store can advantageously be determined from a wear variable Q_v determined in this way by relating the wear variable Q_v to the storage capacity Q_N of the energy store at an earlier time than the time which is applicable to the wear variable Q_v . The storage capacity of the energy store in the new state, that is to say the initial capacity of the energy store, is preferably chosen as the reference.

Accordingly, the Applicants submit that the present Specification provides proper antecedent basis for the term “linked wear variable” and for the subject matter recited in amended Claim 11.

Reconsideration and withdrawal of the objections to the Specification is therefore respectfully requested.

Claim Rejections – 35 U.S.C. § 112

On page 3 of the Office Action, Claims 1-17 were rejected under 35 U.S.C. § 112, ¶ 2, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. The Examiner stated:

5. The claims are generally narrative and indefinite, failing to conform to current U.S. practice. They appear to be a literal translation into English from a foreign document and contain grammatical and idiomatic errors.

Claims 1, 16 and 17: “the wear contributions rising more than proportionally as the battery temperature rises” is not clear since “rising more than proportionally” is neither described, nor shown.

Claim 4: the “lower limit temperature” and the “upper limit temperature” need to be defined.

Claim 5: the “battery temperature below the lower limit temperature needs to be defined.

Claim 6. “the wear contributions increasing more than proportionally with the battery temperature for battery temperatures above an upper limit temperature” is not clear

since “rising more than proportionally¹ is neither described, nor shown.

Claim 10: “the time intervals each being of such...as a function”: the phrase “such as” renders the claim indefinite because it is unclear whether the limitations following the phrase are part of the claimed invention. See MPEP § 2173.05(d).

Claim 11: “the battery has a storage capacity and the wear variable is a measure of the storage capacity of the battery, with the wear variable being related to the storage capacity of the battery at an earlier time than the time which is applicable to the wear variable” is not clear since a) “the wear variable is determined as a sum of temperature-dependent wear contributions over time” (see claim 1], and therefore, if “the wear variable is a measure of the storage capacity of the battery”, the storage capacity of the battery would be zero; and b) “at an earlier time than the time which is applicable” is indefinite. To continue prosecution, it was assumed that the storage capacity of the battery is a function of the wear variable.

The rejections described above are traversed by the Applicants, and are addressed below in turn:

3. Claims 1, 16 and 17 (“rising more than proportionally”)

The Applicants submit that the phrase “the wear contributions rising more than proportionally as the battery temperature rises” would be clear to one of ordinary skill in the art. The present Specification includes the following description at paragraph [0019]:

For battery temperatures above an upper limit temperature, the wear contributions q_v may increase progressively over time with the battery temperature. For battery temperatures in the intermediate range above the lower limit temperatures and below the upper limit temperatures, the wear contributions q_v may increase linearly with time independently of the temperature, and the wear contributions q_v may remain constant for battery temperatures below the lower limit temperature.

As such, the Specification notes at paragraphs [0021]-[0023] (underlining added for emphasis):

It is also possible to represent the temperature dependency on the wear contributions q_v in a simplified form, for example by

differentiation of the temperature bands, with at least one of the temperature bands having a more than proportional temperature dependency. By way of example, the temperature-dependent wear contributions q_v subdivided on the basis of temperature bands can be calculated in accordance with the formulae:

$$q_v = K_0 * A * (1 + a * T + b * T^2)dt \\ \text{for } T \geq T_0$$

$$q_v = K_0 * B * (T - T_1)dt \\ \text{for } T_1 < T < T_0$$

$$q_v = 0 \\ \text{for } T \leq T_1$$

where the coefficient K_0 is a proportionality factor which advantageously reflects the capacity of the energy store. The coefficients A and B are proportionality factors, which may be chosen differently for different temperature bands. The variables in the equations are the battery temperature T in Kelvin [K] and the time t in hours [h].

The parameters A , B , a , b have the following dimensions: A [h^{-1}], a [$degrees^{-1}$], b [$degrees^{-2}$], B [$degrees^{-1}/h$]. The limit temperatures T_1 and T_0 are measured in Kelvin [K].

Different wear mechanisms frequently occur in the temperature bands. The constants c and E and A , B , a , b may therefore have different values in different temperature bands.

Thus, in the exemplary embodiment described above, for at least one of the temperature bands (e.g., a temperature greater than an upper limit temperature), the wear contribution will increase in a non-linear fashion (e.g., the increase in the wear contribution is not in direct proportion to the increase in temperature; instead, the wear contribution increases more than would be expected from a linear relationship with temperature). In the above exemplary embodiment, the wear contribution calculated from the formula $q_v = K_0 * A * (1 + a * T + b * T^2)dt$ will vary non-linearly with temperature such that more wear than would be expected in a linear relationship will be realized.

Accordingly, the Applicants submit that the claim limitation “rising more than proportionally” is sufficiently definite to one of ordinary skill in the art. The Applicants respectfully request withdrawal of the rejection of Claims 1, 16, and 17 under 35 U.S.C. § 112 ¶ 2.

4. Claim 4 (“lower limit temperature” and “upper limit temperature”)

The Applicants submit that the phrases “lower limit temperature” and “upper limit temperature” would be clear to one of ordinary skill in the art. Paragraph [0035] of the present Specification describes one exemplary embodiment as follows:

The following parameter and coefficient values have been found to be advantageous for a lead-acid rechargeable battery . . .

Lower limit temperature $T_1 = 0^{\circ}\text{C} = 273 \text{ K}$

Upper limit temperature $T_0 = 25^{\circ}\text{C} = 298 \text{ K}$.

Accordingly, the Applicants submit that the claim limitations “lower limit temperature” and “upper limit temperature” are sufficiently definite to one of ordinary skill in the art. The Applicants respectfully request withdrawal of the rejection of Claim 4 under 35 U.S.C. § 112 ¶ 2.

5. Claim 5 (“battery temperature below the lower limit temperature”)

As described above with respect to Claim 4, the Applicants submit that the term “lower limit temperature” would be sufficiently definite to one of ordinary skill in the art. Thus, a “battery temperature below the lower limit temperature” refers to any temperature below such “lower limit temperature.”

Accordingly, the Applicants submit that the claim limitation “battery temperature below the lower limit temperature” is sufficiently definite to one of ordinary skill in the art. The Applicants respectfully request withdrawal of the rejection of Claim 5 under 35 U.S.C. § 112 ¶ 2.

6. Claim 6 (“rising more than proportionally”)

As described above with respect to Claims 1, 16, and 17, the phrase “the wear contributions rising more than proportionally as the battery temperature rises” is sufficiently definite to one of ordinary skill in the art reviewing the present Specification.

Accordingly, the Applicants submit that the claim limitation “rising more than proportionally” is sufficiently definite to one of ordinary skill in the art. The Applicants respectfully request withdrawal of the rejection of Claim 6 under 35 U.S.C. § 112 ¶ 2.

7. Claim 10 (“such a size as”)

The Examiner indicated that “the phrase ‘such as’ renders the claim indefinite because it is unclear whether the limitations following the phrase are part of the claimed invention.

The Applicants note that the phrase “such as” is not recited in Claim 10 (the phrase used in the claim is “such a size as”. Further, the M.P.E.P section cited by the Examiner refers to use the phrase “such as” as “exemplary” language (the M.P.E.P. uses “material such as rock wool or asbestos” as one example). The phrase “such a size as” is not used in this manner in Claim 10.

Claim 10 recites (underlining added for emphasis) “the time intervals each being of such a size as a function of the battery temperature that the battery temperature is approximately constant.” In contrast to the Examiner’s contention that Claim 10 is indefinite, the underlined portions actually act to define the size of the time intervals. That is, Claim 10 specifically recites that the time intervals have a size such that the battery temperature in such intervals is approximately constant.

Accordingly, the Applicants submit that the claim limitation “such a size as a function of the battery temperature that the battery temperature is approximately constant” is sufficiently definite to one of ordinary skill in the art. The Applicants respectfully request withdrawal of the rejection of Claim 10 under 35 U.S.C. § 112 ¶ 2.

8. Claim 11 (“the battery has a storage capacity and the wear variable is a measure of the storage capacity of the battery, with the wear variable being related to the storage capacity of the battery at an earlier time than the time which is applicable to the wear variable”)

Claim 11 has been amended to recite “The method of Claim 1 wherein the battery has a storage capacity and further comprising determining the storage capacity using the wear variable by relating the wear variable to a storage capacity of the battery at an earlier time than the time at which the wear variable was determined.” Paragraphs [0024]-[0025] provide a description as follows:

The storage capacity of the electrochemical energy store can advantageously be determined from a wear variable Q_v determined in this way by relating the wear variable Q_v to the storage capacity Q_N of the energy store at an earlier time than

the time which is applicable to the wear variable Q_v . The storage capacity of the energy store in the new state, that is to say the initial capacity of the energy store, is preferably chosen as the reference.

The present storage capacity of the electrochemical energy store can then be determined from the difference between the initial capacity of the energy store in the new state and the wear variable.

Accordingly, the Applicants submit that Claim 11 is sufficiently definite to one of ordinary skill in the art. The Applicants respectfully request withdrawal of the rejection of Claim 11 under 35 U.S.C. § 112 ¶ 2.

9. Other Potential Rejections Under 35 U.S. C. § 112

The Applicants also note that the Examiner stated as follows in Section 10 of the Office Action (with emphasis added):

The above are but a few specific examples of indefinite and functional or operational language used throughout the claims, and are only intended to illustrate the extensive revision required to overcome the rejection under 35 USC 112, second paragraph. The above-mentioned corrections therefore, are in no way a complete and thorough listing of every indefinite and functional or operational language used throughout the claims. Applicant is required to revise all of the claims completely, and not just correct the indefinite and functional or operational language mentioned. The following art rejections are given in view of the above rejections of claims under 35 USC 112, second paragraph. Therefore, the following art rejections are applied only as far as the claims are understood in view of rejections made under the second paragraph of 35 USC 112.

The Applicants submit that it is unclear what is meant by the Examiner in stating that the Applicant is “required to revise all of the claims completely, and not just correct the indefinite and functional or operational language mentioned.” The Examiner has not provided any explanation of the specific additional changes that must be made to the claims in order to overcome the rejection of such claims under 35 U.S.C. § 112, and therefore has not satisfied the initial burden to provide reasons as to why such claims have been rejected (see, e.g., 37 C.F.R. § 1.104(b), Completeness of examiner's action: “The examiner's action will be complete as to all matters, except that in appropriate circumstances, such as

misjoinder of invention, fundamental defects in the application, and the like, the action of the examiner may be limited to such matters before further action is made.”).

The Applicants submit that the claims as currently presented are definite to one of ordinary skill in the art, and respectfully request that the Examiner more clearly identify any additional claim language that the Examiner believes would not be definite to one of ordinary skill in the art. In the absence of such additional explanation, the Applicants submit that such rejection is improper and should be withdrawn.

Claim Rejections – 35 U.S.C. § 103

On page 4 of the Office Action the Examiner rejected Claims 1, 2, and 4 as being obvious over WO 89/01169 to Steffens (“Steffens”) in view of DE 19540827 to Boll (“Boll”) under 35 U.S.C. § 103(a).

The Applicants note that while the Examiner has indicated that Claims 1, 2, and 4 were rejected over the combination of Steffens and Boll, the Examiner also provided various statements on pages 6-7 of the Office Action with respect to Claims 7-9, 11, 12, 13, 14, 15, 16-17. The Examiner also indicated on page 7 that with “respect to the method claims 1-15: the method steps will be met during the normal operation of the apparatus described above.” Accordingly, the Applicants assume for purposes of this response that the Examiner intended to reject each of Claims 1-17 over the combination of Steffens and Boll.

The Examiner stated that Steffens discloses:

[a]n apparatus for monitoring the state-of-charge of a battery including, *inter alia*, means for measuring the battery temperature T, and means responsive to over time/successive measured values of the temperature T [see abstract], and that a battery mathematical model could take into account changing battery characteristics due to aging/determining a wear variable [see page 3, lines 9-14; page 14, lines 26-34; page 20, lines 25-31].

However, the Examiner acknowledged that Steffens does not disclose “the wear variable is determined as a sum of temperature- dependent wear contributions over time.”

The Examiner stated that Boll discloses:

[i]n the abstract the determined aging parts of a battery are summed up, to form a battery aging value/wear variable as a measure for the battery aging condition. The useful end of the battery life is defined as the reaching of a normal battery aging value, which is standardized as a working life duration. A specified percent amount, which is no longer available as power from the battery, is obtained empirically from a specified graph.

The Examiner concluded:

Therefore, it would have been obvious to a person having ordinary skill in the art at the time the invention was made to modify WO's apparatus and include DE's teachings to sum up the determined aging parts and determine a wear variable as a function of the battery temperature overtime, in order to empirically determine the specified percent amount no longer available as power from the battery.

Claim 1 is in independent form and recites a "method for determining the wear to a battery" comprising, in combination with other elements, "determining a wear variable over time as a function of the battery temperature; wherein the wear variable is determined as a sum of temperature-dependent wear contributions over time, with the values of the wear contributions rising more than proportionally as the battery temperature rises". Claims 2-15 depend from independent Claim 1.

Claim 16 is in independent form and recites a "storage battery for motor vehicles" comprising, in combination with other elements, "computation means . . . configured to calculate the wear variable as a function of measured battery temperature using a method comprising . . . determining a wear variable over time as a function of the battery temperature; wherein the wear variable is determined as a sum of temperature-dependent wear contributions over time, with the values of the wear contributions rising more than proportionally as the battery temperature rises".

Claim 17 is in independent form and recites a "system provided with an electrochemical energy store" comprising, in combination with other elements, a "computation device" that "calculates a wear variable as a function of measured battery temperature according to a method comprising . . . determining a wear variable over time as a function of the battery temperature; wherein the wear variable is determined as a sum of

temperature-dependent wear contributions over time, with the values of the wear contributions rising more than proportionally as the battery temperature rises”.

The “method for determining the wear to a battery” recited in independent Claim 1 would not have been obvious in view of Steffens, alone or in any proper combination with Boll under 35 U.S.C. § 103(a). Steffens alone or in any proper combination with Boll does not disclose, teach or suggest a “method for determining the wear to a battery” comprising, in combination with other elements, “determining a wear variable over time as a function of the battery temperature; wherein the wear variable is determined as a sum of temperature-dependent wear contributions over time, with the values of the wear contributions rising more than proportionally as the battery temperature rises”.

The use of wear contributions which rise more than proportionally as battery temperature rises is discussed above with respect to the Examiner’s rejection of Claim 1 under 35 U.S.C. § 112, ¶ 2. Steffens, alone or in any proper combination with Boll, does not teach or suggest such a limitation.

To transform the “Battery State of Charge Indicator” of Steffens and the “Method for determination of the state of ageing of a battery” of Boll into a “method for determining the wear to a battery” (as recited in Claim 1) would require still further modification, and such modification is taught only by the Applicants’ own disclosure. The suggestion to make the combination of Steffens and Boll has been taken from the Applicants’ own specification (using hindsight), which is improper.

The “method for determining the wear to a battery” recited in independent Claim 1, considered as a whole, would not have been obvious in view of Steffens and/or Boll. The rejection of Claim 1 over Steffens in view of Boll under 35 U.S.C. § 103(a) is improper. Therefore, Claim 1 is patentable over Steffens in view of Boll.

Dependent Claims 2-15, which depend from independent Claim 1, are also patentable. See 35 U.S.C. § 112 ¶ 4.

The “storage battery for motor vehicles” recited in independent Claim 16 would not have been obvious in view of Steffens, alone or in any proper combination with Boll under 35 U.S.C. § 103(a). Steffens alone or in any proper combination with Boll does not disclose,

teach or suggest a “method for determining the wear to a battery” comprising, in combination with other elements, “determining a wear variable over time as a function of the battery temperature; wherein the wear variable is determined as a sum of temperature-dependent wear contributions over time, with the values of the wear contributions rising more than proportionally as the battery temperature rises”.

The use of wear contributions which rise more than proportionally as battery temperature rises is discussed above with respect to the Examiner’s rejection of Claim 1 under 35 U.S.C. § 112, ¶ 2. Steffens, alone or in any proper combination with Boll, does not teach or suggest such a limitation.

To transform the “Battery State of Charge Indicator” of Steffens and the “Method for determination of the state of ageing of a battery” of Boll into a “storage battery for motor vehicles” (as recited in Claim 16) would require still further modification, and such modification is taught only by the Applicants’ own disclosure. The suggestion to make the combination of Steffens and Boll has been taken from the Applicants’ own specification (using hindsight), which is improper.

The “storage battery for motor vehicles” recited in independent Claim 16, considered as a whole, would not have been obvious in view of Steffens and/or Boll. The rejection of Claim 16 over Steffens in view of Boll under 35 U.S.C. § 103(a) is improper. Therefore, Claim 16 is patentable over Steffens in view of Boll.

The “system provided with an electrochemical energy store” recited in independent Claim 17 would not have been obvious in view of Steffens, alone or in any proper combination with Boll under 35 U.S.C. § 103(a). Steffens alone or in any proper combination with Boll does not disclose, teach or suggest a “method for determining the wear to a battery” comprising, in combination with other elements, “determining a wear variable over time as a function of the battery temperature; wherein the wear variable is determined as a sum of temperature-dependent wear contributions over time, with the values of the wear contributions rising more than proportionally as the battery temperature rises”.

The use of wear contributions which rise more than proportionally as battery temperature rises is discussed above with respect to the Examiner’s rejection of Claim 17

under 35 U.S.C. § 112, ¶ 2. Steffens, alone or in any proper combination with Boll, does not teach or suggest such a limitation.

To transform the “Battery State of Charge Indicator” of Steffens and the “Method for determination of the state of ageing of a battery” of Boll into a “system provided with an electrochemical energy store” (as recited in Claim 17) would require still further modification, and such modification is taught only by the Applicants’ own disclosure. The suggestion to make the combination of Steffens and Boll has been taken from the Applicants’ own specification (using hindsight), which is improper.

The “method for determining the wear to a battery” recited in independent Claim 17, considered as a whole, would not have been obvious in view of Steffens and/or Boll. The rejection of Claim 17 over Steffens in view of Boll under 35 U.S.C. § 103(a) is improper. Therefore, Claim 17 is patentable over Steffens in view of Boll.

The Applicants respectfully request withdrawal of the rejection of Claims 1-17 under 35 U.S.C. § 103(a).

* * *

It is submitted that each outstanding objection and rejection to the Application has been overcome, and that the Application is in a condition for allowance. The Applicants request consideration and allowance of all pending Claims 1-17.

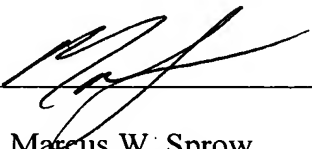
The Examiner is invited to contact the undersigned by telephone if it is felt that a telephone interview would advance the prosecution of the present application.

The Commissioner is hereby authorized to charge any additional fees which may be required regarding this application under 37 C.F.R. §§ 1.16-1.17, or credit any overpayment, to Deposit Account No. 06-1447. Should no proper payment be enclosed herewith, as by a check being in the wrong amount, unsigned, post-dated, otherwise improper or informal or even entirely missing, the Commissioner is authorized to charge the unpaid amount to Deposit Account No. 06-1447. If any extensions of time are needed for timely acceptance of papers submitted herewith, Applicants hereby petition for such extension under 37 C.F.R. §1.136 and authorizes payment of any such extensions fees to Deposit Account No. 06-1447.

Respectfully submitted,

Date 4/11/2005

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